Advanced Component Technology Program

Beamsteerable GNSS Radio Occultation ASIC

Completed Technology Project (2015 - 2017)

Project Introduction

We will develop an integrated RF ASIC to enable high quality radio occultation (RO) weather observations using the Global Navigations System Satellite (GNSS) constellations. In addition, the realization of a low power highly integrated RF front end for space applications will enable large beam forming arrays to provide the necessary signal to noise ratio to produce ocean altimetry and scatterometry observations. We will enable constellations of low power satellites that would dramatically increase weather prediction ability. A small low power RO instrument will enable easier accommodation on missions of opportunity. The proposed design will support four RF inputs capable of receiving three GNSS signals per input in a single application specific integrated circuit (ASIC). Multiple RF channels on a GNSS receiver IC is a unique feature which enables precision beam forming. While we address the tougher requirements driven by the science, it will also be applicable for precise orbit determination receivers. During the thirty-six month performance period we will design, fabricate and test an integrated circuit and demonstrate performance and environmental qualification by completing the following tasks: • Complete detailed requirements to enable high quality scientific measurements. • Design an integrated RF front end suitable for application in a radiation environment. • Fabricate the ASIC in a suitable technology. • Test the front end with the JPL GNSS receiver, simulator and beam steerable antenna. • Verify the design to the required environments, including radiation testing. Our team includes members of the JPL TRiG GNSS receiver team, industry leading GNSS receiver ASIC developers with radiation and space qualification experience, and a GNSS Scientist. This task will advance TRL from 2 to 5, and will enable smaller, lower power and lower cost weather observation instruments that will improve weather forecasting, and will produce new GNSS-based science by enabling ocean altimetry and scatterometry measurements

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Table of Contents

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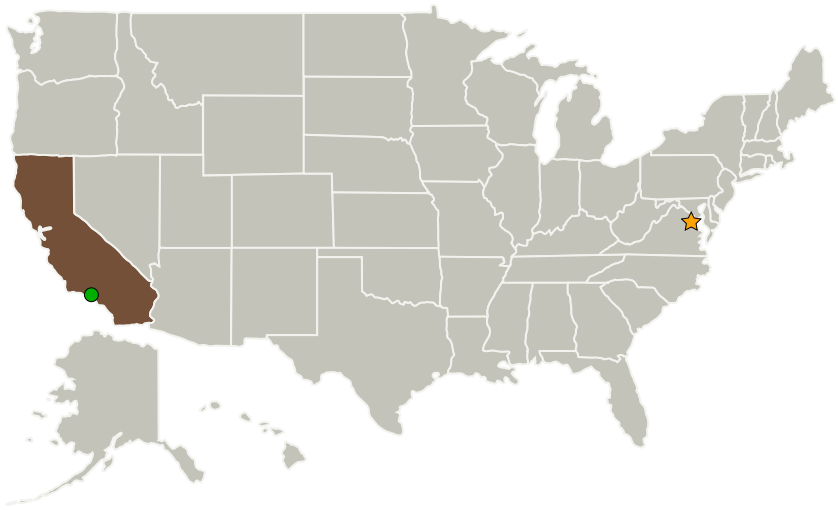
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★NASA Headquarters(HQ)	Lead Organization	NASA Center	Washington, District of Columbia
GigOptix	Supporting Organization	Industry	
●Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Lead Center / Facility:

NASA Headquarters (HQ)

Responsible Program:

Advanced Component Technology Program

Project Management

Program Director:

Pamela S Millar

Program Manager:

Amber E Emory

Principal Investigator:

Michael J Shaw

Co-Investigator:

Irshad A Rasheed

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Images

91-1373479894122.png
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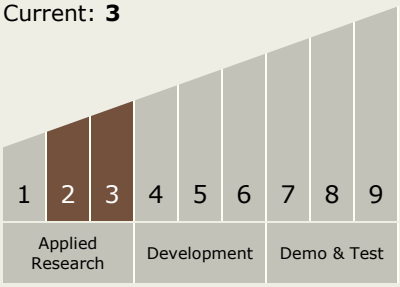
(https://techport.nasa.gov/image/5097)

Technology Maturity (TRL)

Start: **2**
Current: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destination

Earth